

Nationwide Numeracy News

Renee Hill, Riverside Unified School District

February 27, 2010

<http://algebraforum.wikispaces.com/mathink2010>
 web: <http://bit.ly/ElemEdDept> blog: ElemEdDept.blogspot.com
 twitter: ElemEdDept

Thank you

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- ▶ Matt Larson, Lincoln Public Schools mrl@lps.org

Presentation Structure

- ▶ Welcome
- ▶ Need
 - ▶ National
 - ▶ State
 - ▶ Local
- ▶ Research
 - ▶ Teaching
 - ▶ Classroom Structures
 - ▶ Student Engagement
- ▶ Next Steps



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Nice to Meet You.



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Presentation Outcomes and Beyond:

- ▶ Recognize the need for promoting high quality mathematics instruction
- ▶ Learn how current data and research support student success in mathematics, especially algebra
- ▶ Gather tools and strategies to:
 - ▶ Deliver a high-quality mathematics program
 - ▶ Identify and structure more effective interventions for struggling students
- ▶ Use the power point presentation to share with various constituency groups to find ways to improve student achievement in mathematics

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National Scene

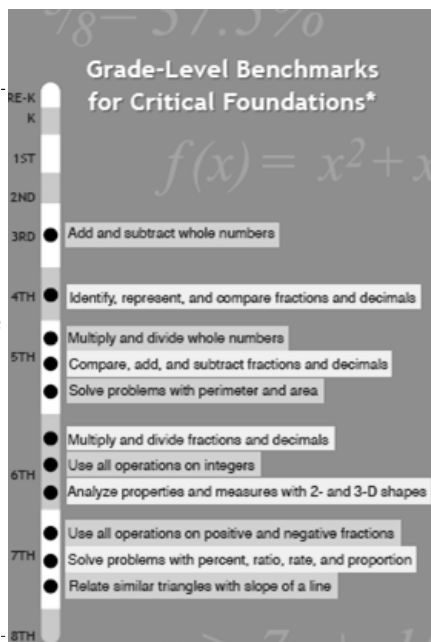
- ▶ National Math Panel
- ▶ Standards Movement
 - ▶ College and Career Ready Standards
 - ▶ Common Core State Standards
- ▶ Race to the Top, including
 - ▶ Teacher Effectiveness
 - ▶ Improved Collection and Use of Data
 - ▶ Standards and Assessments
 - ▶ Support for Struggling Schools

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National Math Panel

- ▶ Formulated 2006
- ▶ Final Report 2008
 - ▶ Core Principles of Math Instruction
 - ▶ Student Effort Is Important
 - ▶ Importance of Knowledgeable Teachers
 - ▶ Effective Instruction Matters
 - ▶ Effective Assessment
 - ▶ Importance of Research

Doing What Works: National Math Panel
http://dww.ed.gov/practice/?T_ID=20&P_ID=48



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Common Core State Standards Initiative

- ▶ A state-led effort coordinated by the National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO).
- ▶ **College- and Career-Readiness Standards** were released for comment in September 2009. The standards and a summary of 1,000 responses from the public can be viewed at www.corestandards.org
- ▶ **K-12 Common Core State Standards** are due for release for public comment next month, March 2010.
- ▶ **Standards adoption** is defined as incorporating 85% of these standards at the state level.
- ▶ **Kentucky** adopted the standards in January.

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Common Core Strand Progressions and Grade Ranges K-8

Strand	Progression	Start	End
Number	Counting and Cardinality	K	K
	Early Relations and Operations	K	1
	Base Ten Computation	K	5
	Quantity and Measurement	K	5
	Operations and the Problems They Solve	2	4
	Fractions	3	5
	Ratios and Proportional Relationships	6	7
	The Number System	6	8
Geometry	Shapes	K	4
	Coordinate Geometry	5	5
	Geometry	6	8
Algebra	Expressions and Equations	6	7
	Functions & The Situations They Model	8	8
Data	Statistics	5	8
	Probability	7	8



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40 States Applied for Race to the Top

- ▶ Adopting **standards and assessments** that prepare students to succeed in college and the workplace and to compete in the global economy;
- ▶ Building **data systems** that measure student growth and success, and inform teachers and principals about how they can improve instruction;
- ▶ Recruiting, developing, rewarding, and retaining effective **teachers and principals**, especially where they are needed most; and
- ▶ **Turning around** our lowest-achieving schools.

<http://www2.ed.gov/programs/racetothetop/index.html>

<http://www2.ed.gov/policy/gen/leg/recovery/programs.html> for a full view of education reform



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California Has:

- ▶ Adopted State Standards
- ▶ Aligned textbooks to Standards
- ▶ Created a state assessment system
- ▶ Funded textbook staff development
- ▶ Increased the number of students in Algebra I



How is this working?

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Comparison of 8th Grade Students by State

Percent Enrolled in College Prep Math Courses (Advanced)

versus

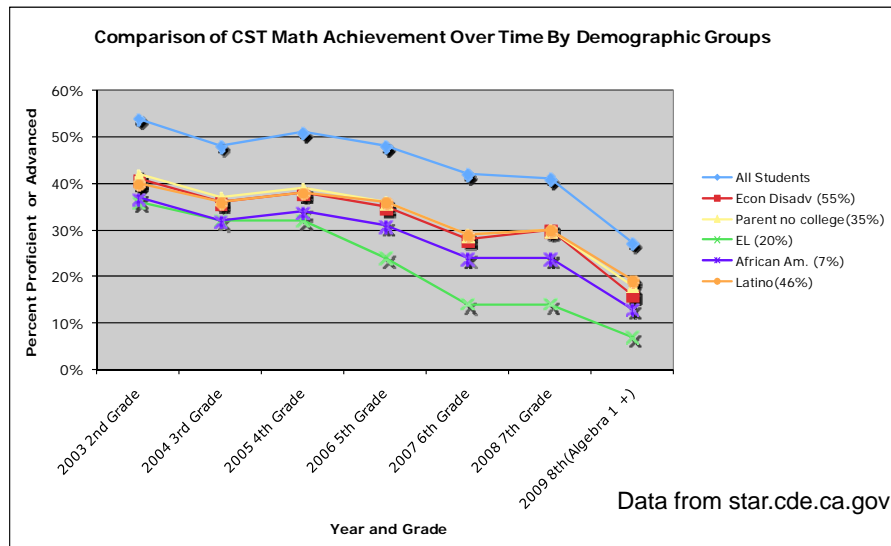
Mean Score of Students on NAEP (8th grade 2007)

Loveless, 2008

Jurisdiction	Score	Enrollment
National	281	38%
Massachusetts	298	45%
Minnesota	292	35%
North Dakota	292	21%
Vermont	291	26%
Kansas	290	39%
New Jersey	289	40%
South Dakota	289	30%
Virginia	288	42%
New Hampshire	288	30%
Montana	287	24%
Wyoming	287	32%
Maine	286	29%
Colorado	286	44%
Pennsylvania	286	42%
Texas	286	28%
Maryland	286	52%
Wisconsin	286	30%
Iowa	285	27%
DoDEA	285	40%
Indiana	285	33%
Washington	285	31%
Ohio	285	35%
North Carolina	284	33%
Oregon	284	39%
Nebraska	284	35%
Idaho	284	37%
Delaware	283	36%
Connecticut	282	39%
South Carolina	282	41%
Utah	281	58%
Missouri	281	33%
Illinois	280	33%
New York	280	21%
Kentucky	279	34%
Florida	277	42%
Michigan	277	38%
Arizona	276	32%
Rhode Island	275	41%
Georgia	275	49%
Oklahoma	275	27%
Tennessee	274	31%
Arkansas	274	33%
Louisiana	272	24%
Nevada	271	34%
California	270	59%
West Virginia	270	33%
Hawaii	269	28%
New Mexico	268	34%
Alabama	265	30%
Mississippi	265	21%
District of Columbia	248	51%

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The Achievement Gaps Continues...



Students from traditionally underserved demographic population continue to under-achieve over the past 7 years.

California's Race to the Top Application

Information summarized from a California School Boards Association Legislation and policy update, February 2010 <http://www.csba.org/~media/63C1B3C78673492E9BD51800FABBB000.ashx>

► Common Core Standards

- If the State Board adopts the standards by the deadline, the Curriculum Commission will immediately begin the process to create the curriculum frameworks. Then the commission will invite submissions of and in July 2012 for mathematics and May 2013 for ELA, the commission will make recommendations to the SBE for the adoption of the new instructional materials.

► Open Enrollment Act

► Turning Around the Lowest Achieving Schools

► Parent Empowerment

An Ongoing Effort: California Algebra Forum

- ▶ Collaborative effort between the California Department of Education, the county offices' Curriculum and Instruction Steering Committee and the California Comprehensive Assistance Center at WestEd and other stakeholders
- ▶ Hosted two statewide Algebra Forum meetings with attendees coming from all 11 statewide regions (May 2007 and October 2008)
- ▶ Variety of participants: curriculum leaders, district, county, site administrators, teachers, higher education representatives, business
- ▶ Maintaining an online professional community

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Algebra Forum Goals

- ▶ Share at the state, regional and local levels knowledge of current research that supports success in algebra
- ▶ Provide continuing support and resources for the statewide network of technical assistance providers
- ▶ Support the development of Mathematical Proficiency for all students
- ▶ Broaden our statewide collaboration with relevant stakeholders to advocate for policies that support a clear, cohesive and consistent vision for mathematics in California.

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Overarching Guiding Questions

- ▶ What can we do to foster and support algebraic proficiency for ALL students?
- ▶ How can research inform instructional practices and policy?
- ▶ How do YOU become an advocate for high-quality mathematics instruction and assessment?

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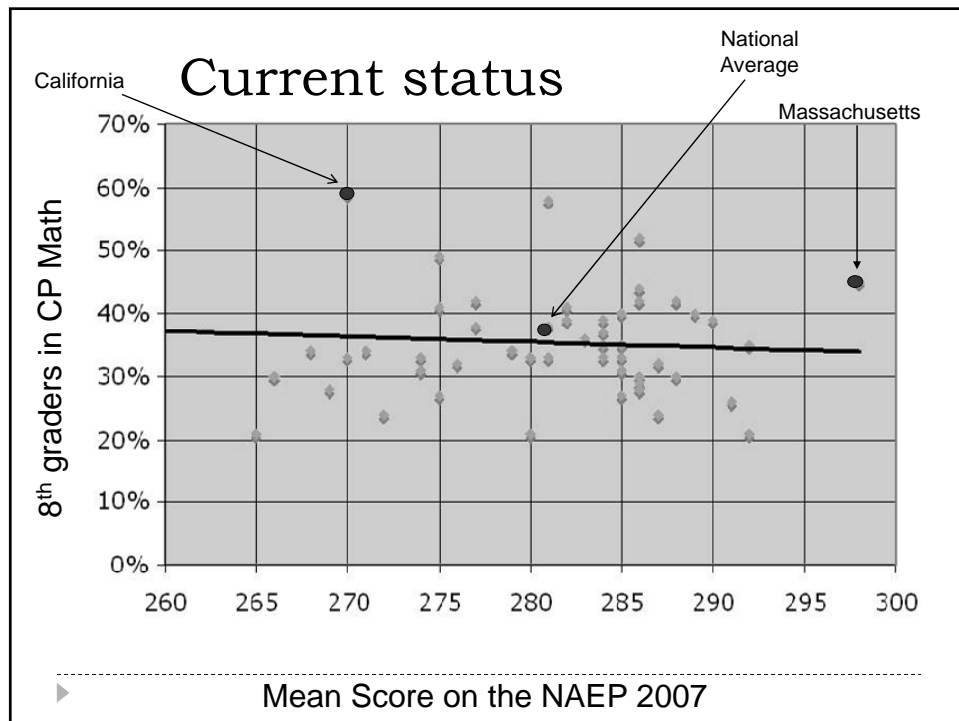
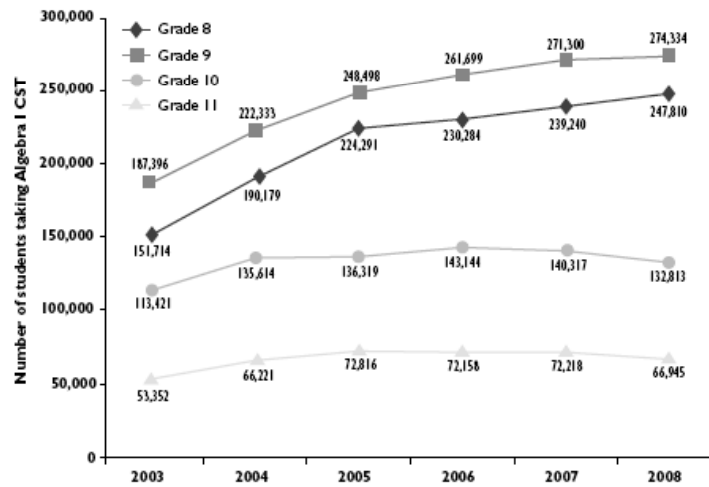


figure 2A | More California students are taking Algebra I and are taking it earlier



EdSource, May, 2009

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Some things that don't work

figure 4 | Many students in the high school grades have taken the Algebra I CST more than once

Grade	Students in Grade Taking the Algebra I CST in 2008	Algebra I CST-takers Who Are First-time Examinees	Algebra I CST-takers Who Are Repeating the Assessment
7	25,573	25,573 (100%)	0 (0%)
8	246,587	242,062 (98%)	4,525 (2%)
9	272,353	167,819 (62%)	104,534 (38%)
10	131,415	62,834 (48%)	68,581 (52%)
11	66,108	31,901 (48%)	34,207 (52%)

DATA: CALIFORNIA DEPARTMENT OF EDUCATION, 2008 Standardized Testing and Reporting (STAR) Program Summary of Results, AUGUST 2008.

EdSource 5/09

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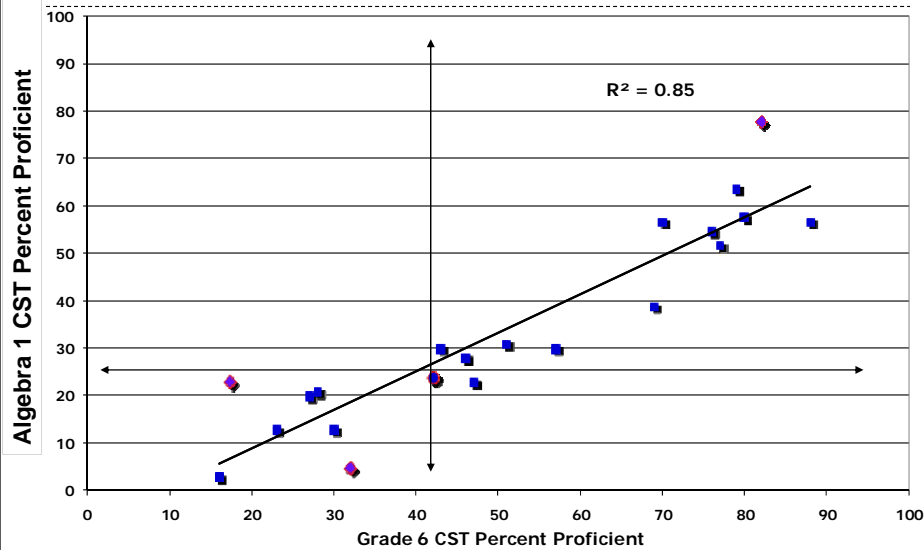
Things That Don't Work as Stand-Alones

- ▶ Class Size Reduction
- ▶ Whole School Reform (School Governance, Small Schools, etc.)
- ▶ Re-vamp class time (Bell Schedules, Year Around Schools, Block Schedules, etc.)
- ▶ Innovative Curriculum
- ▶ Traditional Curriculum (Back to Basics)
- ▶ High-stakes Accountability (rewards/sanctions)
- ▶ Choice (charter schools, magnet schools, etc.)
- ▶ Centralize Leadership and Policies (State or National)

Not one of these STRUCTURAL changes, in and of itself, has shown to have significant impact on student achievement!

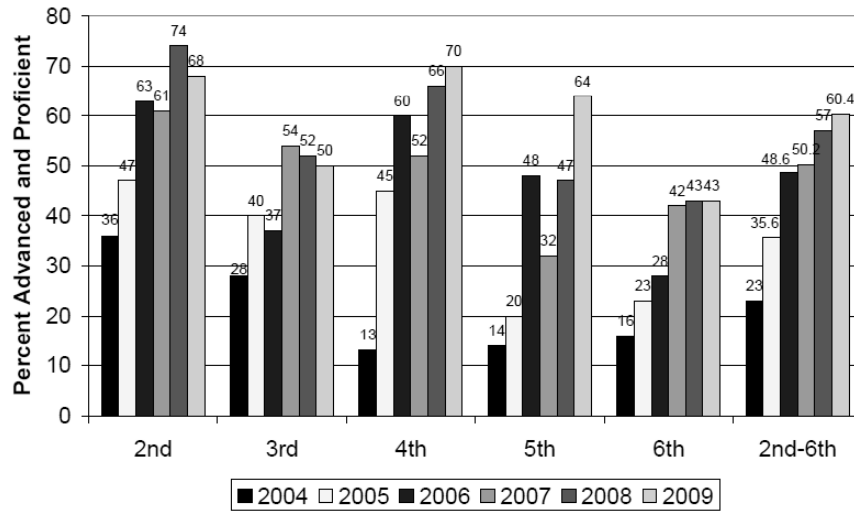
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Preparing students well in K-7 math DOES work



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...and we know it's possible



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The Quality of Teaching works



“The quality of instruction is the single most important component of an effective mathematics program. The international comparisons show a high correlation between the quality of mathematics instruction and student achievement.”

Beaton, et al., 1996, Mathematics Framework for California Public Schools, page 9

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Good Instruction Makes A Difference

Good teaching can make a significant difference in student achievement, *equal to one effect size (a standard deviation)*, which is also equivalent to the affect that demographic classifications can have on achievement.



Paraphrase Dr. Heather Hill, University of Michigan

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Our research indicates that there is a 15% variability difference in student achievement between teachers within the same schools.

Deborah Loewenberg Ball

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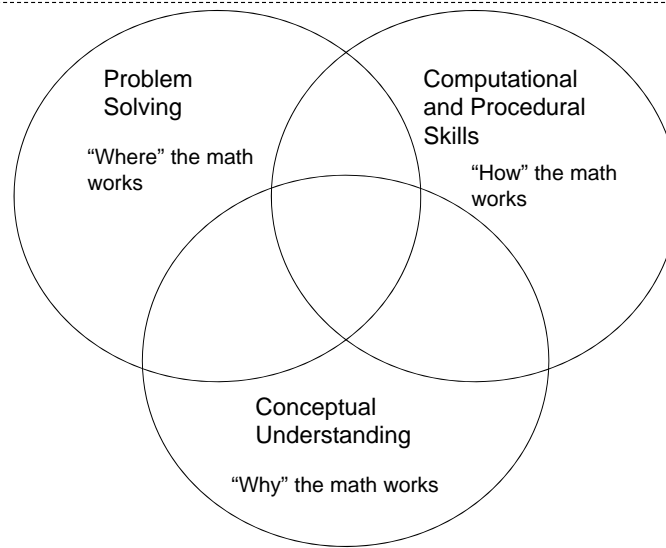
Stanford University
School of Education

We were led to *teacher professional development* as the fundamental lever for improving student learning by a growing research base on the influences on student learning, which shows that *teacher quality trumps virtually all other influences on student achievement*.

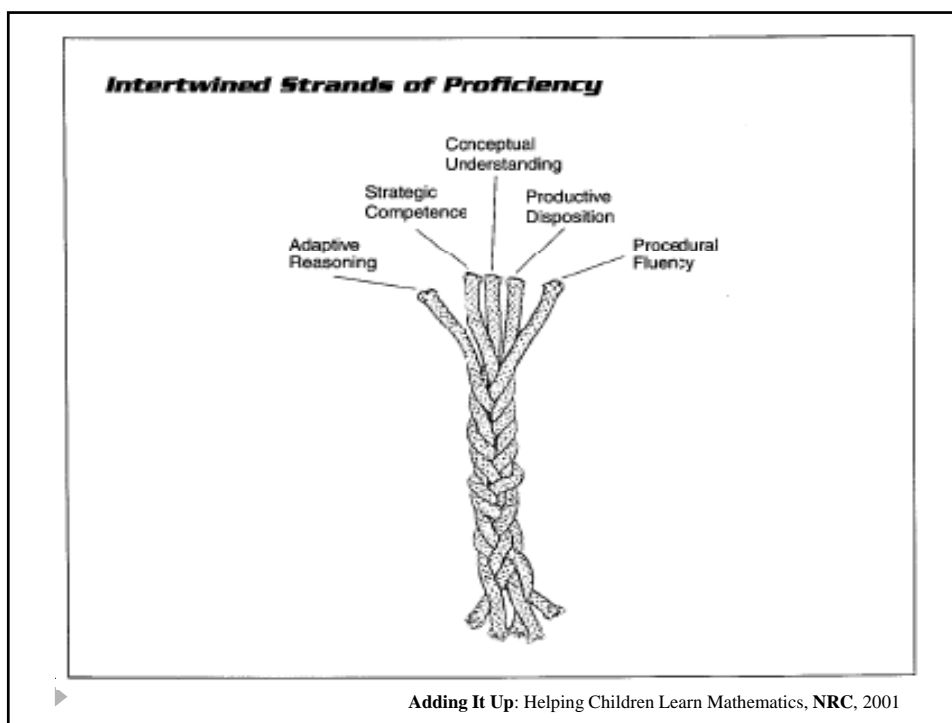
(e.g., Darling-Hammond, 1999; Hamre and Pianta, 2005; Hanushek, Kain, O'Brien and Rivken, 2005; Wright, Horn and Sanders, 1997)

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Balanced Instruction Works



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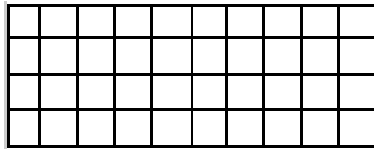
Depth of Knowledge

- ▶ Level 1: Recalling and Recognizing
 - ▶ Student is able to recall routine facts of knowledge and can recognize shape, symbols, attributes and other qualities.
- ▶ Level 2: Using Procedures
 - ▶ Student uses or applies procedures and techniques to arrive at solutions or answers.
- ▶ Level 3: Explaining and Concluding
 - ▶ Student reasons and derives conclusions. Student explains reasoning and processes. Student communicates procedures and findings.
- ▶ Level 4: Making Connections, Extending and Justifying:
 - ▶ Student makes connections between different concepts and strands of mathematics. Student extends and builds on knowledge to a situation to arrive at a conclusion. Students use reason and logic to prove and justify conclusions.

Adapted from the work of Dr. Norman Webb-University of Wisconsin

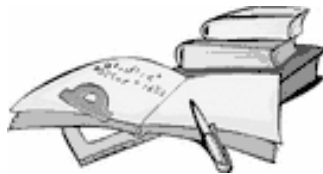
Doing Mathematics

- Shade 6 small squares in a 4×10 rectangle. Using the rectangle, explain how to determine each of the following:
- the percent of area that is shaded.
 - the decimal part of area shaded.
 - the fractional part of area shaded.



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Supporting Struggling Students Works



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Catching Up

- ▶ Students with history of going slower are not going to catch up without spending more time and getting more attention.
- ▶ Who teaches whom?
- ▶ Change the metaphor: not a “gap” but a knowledge debt and need for know-how. The knowledge and know-how needed are concrete, the stepping stones to algebra.

Phil Daro
America's Choice
Speaker: Algebra Forum II

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Intensification

Situation of Student	Needed by Student	Intervention
Keeps up	Regular Instruction	None
Struggles some assignments	Extra feedback on work, thinking	Classroom Q&A, partner, teacher's ear
Not bringing enough from earlier lessons each day	Extra support with regular program	Homework clinic, tutoring, attention beyond regular class
Misconceptions disrupt participation	In depth concentration on troublesome concepts	Sustained instruction with special materials beyond regular class
More than a year behind, misconceptions from many years	Intensive ramp-up course	Designed double period ramp-up course, Extended day, Summer schools

Phil Daro

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Promising Intervention Practices

- ▶ Extra Time (Double periods/block, full year course)
- ▶ Best teachers working with struggling students
- ▶ Teach for conceptual understanding
- ▶ Teachers attend to students' self-image, productive disposition and status
- ▶ Pre-teach instead of remediate
- ▶ Arithmetic through the lens of algebra

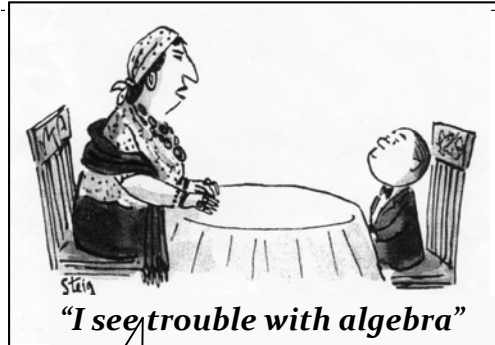
David Foster
Noyce Foundation
Speaker-Algebra Forum II

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Where Do We Go From Here?

- ▶ Preparing for change
- ▶ Quality of Instruction
- ▶ Teacher Professional Development
- ▶ Balanced Instruction
- ▶ Levels of Knowledge
- ▶ Supporting Struggling Students
- ▶ Preteach
- ▶ School mathematics taught with an algebraic lens

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NO

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Closure

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